

*Remarks*

Claims 1-27 are pending. Claim 28 has been cancelled. Claims 1-4, 6-13, and 15-27 have been amended. No new matter has been added.

*In the Specification*

Paragraph 0028 of the specification is objected to because of formalities related to “attribute X”. The applicants respectfully submit that the description is clear and no amendment is required. Paragraph 0028 states:

Fig. 1 is a diagram showing examples of logical volumes and their intent, an initial configuration of the logical volumes in a given hardware environment, a requested operation, a specification of resources needed to perform the operation, a specification for acquisition of resources that cannot be satisfied with the available hardware, and, if applicable, a specification for reservation of resources that can be satisfied with the available hardware. The environment includes three 20-gigabyte storage devices, each having a different value for the attribute X. Storage device 120A has respective 10-gigabyte storage regions 122A and 124A, each of which is a contiguous set of blocks of storage device 120A, and an attribute value of X=X1. Storage device 120B has 10 gigabyte storage regions 122B and 124B, and an attribute value of X=X2, and 20 gigabyte storage device 120C has 10 gigabyte storage regions 122C and 124C, and an attribute value of X=X3.

The specification describes an arbitrary attribute X associated with various storage devices. That attribute can have various values, and in the example shown above, those values are X1, X2, and X3 for each of three respective storage devices. Other examples are illustrated in paragraphs 0059 and 0060 where various disks have a controller attribute that can take values such as C1, C2, C3, or C4. Accordingly, the applicants respectfully submit that the specification is clear with respect to attributes.

*Rejection of Claims under 35 U.S.C. § 101*

Claims 1-9 and 13-28 stand rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter because the claims “are claiming subject matter that consists solely of the manipulation of an abstract idea and does not consist of a physical transformation or accomplish a concrete or tangible result.” Office Action of April 10, 2006, p. 3 ¶1. The Examiner goes on to argue that the determining and searching

operations of claim 1 do not “achieve a practical application to carry out a concrete and tangible result.” Office Action of April 10, 2006, p. 3 ¶2.

The applicants respectfully disagree. The Examiner provides no explanation why these operations do not provide a concrete and tangible result, but merely makes the conclusory statement. However, the applicants respectfully submit that the rejected claims neither (1) consist solely of the manipulation of abstract ideas nor (2) fail to accomplish a tangible result. Claim 1 (as do the other independent claims) requires determination of a specification of needed storage regions, storage regions that comply with specific criteria. These storage regions are needed for a volume which is quite tangible, e.g., formed from various storage devices. Moreover, the searching operation explicitly requires searching existing storage regions, which are portions or complete physical storage devices. Finally, a second specification is determined under certain circumstances.

The processes are not mere manipulation of ideas, but include concrete operations on physical devices. Moreover, the results are tangible, particularly as part of an overall process to perform an operation on a logical volume. Accordingly, the applicants respectfully submit that claims 1-9 and 13-27 describe statutory subject matter and are therefore allowable.

*Rejection of Claims under 35 U.S.C. § 112*

Claims 2-12, 19-22, and 24-28 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Specifically with respect to claim 2, **Figure 2** and paragraphs 0033-0036 describe, for example, a situation where a storage region in a first set as described by a first specification (e.g., 10GB for V1 mirror 2 in specification of resources needed **240**) is not available in existing storage and therefore becomes part of a second specification (e.g., specification for acquisition **250**). In general, there is no reason (and the Examiner points to no such rationale) why two specifications of two sets of storage regions cannot include the same storage region. An example in keeping with claim 9 is further seen where

storage for V1 mirror 1 is excluded from the specification for acquisition because existing storage has been found. Accordingly, the applicants respectfully submit that claims 2-12, 19-22, and 24-28 satisfy the requirements of §112, ¶1.

Claims 2-12, 19-22, and 24-28 are rejected under 35 U.S.C. § 112, second paragraph. The rationale for this rejection appears to be similar to that of the enablement rejection, and thus the applicants respectfully submit that the claim language is definite for the reasons noted in the above paragraphs. Put simply, the Examiner has provided no explanation as to why it is unreasonable for a storage region to belong to two different sets of storage regions. Accordingly, the applicants respectfully submit that claims 2-12, 19-22, and 24-28 satisfy the requirements of §112, ¶2.

Nevertheless, and in the interest of advancing prosecution of the present application, the applicants have amended independent claims 1, 13, 18, and 23 to clarify the differences among the various storage regions and sets of storage regions. Claims 2-4, 6-12, 15-17, 19-22, and 24-27 have been amended to agree with the amendments in corresponding independent claims and, in some cases, to correct dependency.

*Rejection of Claims under 35 U.S.C. § 102/103*

Claims 1-9 and 13-28 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Soejima et al., U.S. Patent Application Publication 2003/0074528 (Soejima). Claims 10-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Soejima in view of purported Applicant Admitted Prior Art. The applicants respectfully traverse these rejections.

Soejima neither teaches nor suggests a method comprising:

determining a first specification for a first set of needed storage regions, wherein the first set of needed storage regions is needed to perform an operation on a logical volume, and the first set of needed storage regions satisfies an intent of the logical volume;

searching a plurality of existing storage regions for a corresponding existing storage region for each needed storage region in the first set of needed storage regions; and

if no existing storage region is found corresponding to a first needed storage region in the first set of needed storage regions, determining a second specification for a second set of storage regions to be acquired,

as required by independent claim 1 and generally required by independent claims 13, 18, and 23.

Regarding the claimed determining operation, the Examiner refers to paragraphs 0017-0019 of Soejima which state:

In accordance with an aspect of the present invention, there is provided a volume management method for setting at least a logical volume over a plurality of physical storage devices, said volume management method comprising the steps of:

receiving a volume creation request specifying information on a requested storage capacity and information on requested average performance;

forming a judgment as to whether or not there exists an unoccupied area satisfying the requested storage capacity throughout the storage devices.

In particular, the Examiner appears to equate Soejima's volume creation request with the claimed "first specification for a first set of needed storage regions." The applicants respectfully disagree. While Soejima's volume creation request may include information about storage capacity and average performance, there is nothing in the cited portion of Soejima teaching or suggesting that the request include a specification of a set of needed storage regions. Similarly, because Soejima is silent as to the first set of needed storage regions, there is no teaching or suggestion that the storage regions are needed to perform an operation on a logical volume. The Examiner references paragraph 0017 (e.g., "setting at least a logical volume over a plurality of physical storage devices"), but this fails to teach storage regions needed for the performance of an operation on an existing volume. As to the claimed intent for which the first set of needed storage regions are needed, the Examiner alludes to paragraph 0019. However, this paragraph simply recites "forming a judgment as to whether or not there exists an unoccupied area satisfying the requested storage capacity throughout the storage devices." Thus, there is no teaching or suggestion of an intent of the logical volume or a determination whether the first set of needed storage regions satisfies that intent.

Regarding the claimed searching operation, the Examiner refers to paragraphs 0022 and 0024, which state:

In accordance with another aspect of the present invention, there is provided a volume management method for searching a storage apparatus

comprising a plurality of physical storage devices, on which at least one logical volume is set, for an unoccupied area used by a new volume over some of said physical storage devices, said volume management method comprising the steps of:

... forming a judgment as to whether or not all volumes, which include existing volumes and the new volume supposed to be added to the existing volumes, each satisfy its requested average performance by referring to information of requested average performance on a storage means for each of the existing volumes which share any of the storage device with an unoccupied area; and

While Soejima teaches searching a storage apparatus for an unoccupied area used by a new volume, the reference fails to teach or suggest searching existing storage regions for *a corresponding existing storage region* for each needed storage region in the first set. As noted in paragraph 0024 of Soejima, the search is used to form a judgment as to whether or not *all* volumes satisfy a requested average performance.

Regarding the claimed determining a second specification, the Examiner refers generally to alternate plan execution as described in Figures 4 and 6. However, the referenced alternate plans simply do not teach or suggest determining a second specification for *a second set of storage regions to be acquired* if no existing storage region is found corresponding to the first needed storage region. Accordingly, the applicants respectfully submit that independent claims 1, 13, 18, and 23 are allowable over Soejima. Claims 2-12, 14-17, 19-22, and 24-27 depend from independent claims 1, 13, 18, and 23, and are allowable for at least this reason.

In view of the amendments and remarks set forth herein, the application is believed to be in condition for allowance and a notice to that effect is solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the examiner is requested to telephone the undersigned.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA, 22313-1450, on

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Date of Signature

Respectfully submitted,



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